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THESIS

PROFILE OF AN EFFECTIVE ENGINEERING MANAGER
AT THE NAVAL AVIONICS CENTER

by

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and

Natalie A. Quick

June 1991

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General managerial effectiveness ratings were most strongly related to behaviors demonstrating interpersonal skill and sensitivity along with

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Recommendations are offered for managerial development
at the NAC Institute.

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Profile of an Effective Engineering Manager
at the Naval Avionics Center

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ABSTRACT

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strongly related to behaviors representing the management of
external interfaces, building cooperative teamwork and the
assignment of task and development opportunities based on
performance. Recommendations are offered for managerial
development at the NAC Institute.

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I. INTRODUCTION

A. BRIEF OVERVIEW

This thesis is an empirical study that identifies the characteristics of effective engineering managers at the Naval Avionics Center (NAC). The study was commissioned by the Director of the Civilian Personnel Department at NAC. A major purpose of the study is to provide information on effective engineering management that can be used in the training and development programs of the Naval Avionics Center Institute.

B. BACKGROUND

1. The Naval Avionics Center

The Naval Avionics Center (NAC) is a Department of Defense field activity located in Indianapolis, Indiana. The Center was built in 1942 to manufacture the then top secret Norden bombsight. Since the Navy took over the plant in 1945, NAC's mission has expanded into all aspects of military electronics and now provides a full spectrum of support, including engineering design and development, rapid prototyping, pilot manufacturing, all phases of acquisition including procurement and acquisition management, and local program management of major assigned programs.

NAC is an industrially-funded field activity that operates under the authority of the Naval Air Systems Command (NAVAIR). Because NAC does not receive appropriated funds from Congress, it operates in a similiar manner to a private enterprise. The customers of NAC provide the funds for NAC's operations and salaries in return for performance of specific work assignments on a project-by-project basis. If NAC does not satisfy the requirements of its contract with the customer by delivery of products and services in a competitive manner, NAC will be out of business.

NAC employs a workforce of over 3400 civilian personnel, of whom 34% are scientists and engineers and 27% are highly-skilled craftspersons and equipment operators. NAC is organized in functional departments with program management provided on a matrix basis. The basic organization chart is provided in Appendix A.

2. **Naval Avionics Center Institute (NACI)**

NAC Institute was established in FY 1990 by the Director, Civilian Personnel. The purpose of the Institute is to support the implementation of the NAC Leadership/ Management Principles throughout NAC. The Leadership/ Management Principles are as follows:

- Develop and Maintain a Corporate Outlook.
- Communicate the Organizational Vision through Positive Leadership.
- Seek and Promote Career Development.

- Seek Continual Organizational Improvement.

- Manage Programs, Projects and Services.

- Demonstrate and Encourage Communication/Cooperation/
  Teamwork.

The mission of the Institute is to plan, implement and manage programs to promote the development and continuous improvement of NAC's management work force. In order to accomplish this mission, the Institute maintains programs in manpower and personnel analysis and organizational development.

Some of the management programs sponsored by NACI are as follows.

a. Executive Development

A variety of programs are sponsored to assist in the development of senior executives. The **Executive Forum** provides senior executives with a background in the changing social, economic, political and technological issues that affect the corporate environment. The **Senior Executive Management Development Program** (SEMDP) was designed to prepare personnel to be successful in senior line management positions and to develop candidates for Civilian Material Professional positions and Technical Management positions.

b. Management Development

Programs were also designed to assist in the developing middle managers. The **Management Excellence Program** was designed to provide middle managers with the

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opportunity to renew and strengthen their leadership and management skills. The **Management Development Program** was designed for personnel who have the potential to be effective leaders but are not yet managers. NACI sponsors other programs that help middle managers or management candidates develop their skills, such as the **Women's Executive Leadership Program.** Participants of the above programs have mentors assigned and formal individual plans developed.

c. Supervisory Training

NACI provides a core program that includes training in basic skills, communications, labor relations and the NAC Leadership/Management Principles for all leaders and supervisors at NAC. These programs are designed to provide leaders and supervisors with the skills needed to deal with day-to-day situations along with an introduction to leadership and management concepts.

3. Engineers at NAC

Engineers comprise the majority of the "Knowledge Workers" who form a critical core of NAC's human resources. These engineers are predominently found in five of the nine departments in the NAC organization. These departments are "200" (Manufacturing Technology), "400" (Product Integrity and Assurance), "700" (Technical and Operations Support), "800" (Systems Technology) and "900" (Systems and Engineering). These engineers are civil servants who are

salaried employees paid on the standard regional government GS/GM pay scales.

C.   OBJECTIVE AND RESEARCH QUESTIONS

1.   Objective

This thesis will identify the behavioral and attitudinal profiles of effective engineering managers at NAC. The objective is to conduct an empirical study to investigate what behavioral and attitudinal factors determine the effectiveness of engineering managers at NAC.

2.   The Research Questions

The following specific research questions will be addressed.

a.   Primary Research Question

- What are the behavioral and attitudinal profiles of effective engineering managers at the Naval Avionics Center?

b.   Subsidiary Questions

- What are the criteria for identifying effective engineering managers at NAC?

- What managerial behaviors and attitudes relate to specific outcome criteria used as indicators of effectiveness?

- What are the implications for managerial selection and training?

D.   SCOPE AND LIMITATIONS

1.   Scope

This thesis will focus on managers of engineers rather than all types of managers. More specifically the

study will focus on branch managers in the engineering departments. The study will empirically identify managerial behaviors that may influence branch manager effectiveness (as rated by subordinate engineers and scientists in a branch). The final outcome of the study will be providing a profile of an effective engineering manager.

2. <u>Limitations</u>

This thesis will specifically focus on the branch managers in the two largest engineering departments, the "800" (System and Technology) and the "900" (Systems and Engineering) departments. These two departments include engineers and managers with a project rather than a process focus. It is possible that profiles of effectiveness may be different for project versus process managers. However, the more limited population in the latter category, prevents studying them in the same detail.

In addition, this thesis analyzes data on effectiveness as seen from the viewpoint of subordinates. Ratings of the effectiveness of engineering branch managers by superiors were still being collected as this thesis was written, and will be included in later analysis by NPS researchers.

E. ORGANIZATION OF STUDY

Chapter II will provide a review of pertinent literature on the characteristics of effective engineering managers.

Chapter III will provide the methodology used for conducting the research for this thesis. Chapter IV will present the data collected from the questionnaires and the analysis of the results. Finally, Chapter V will provide conclusions, implications for NAC and recommendations for further research.

II. <u>LITERATURE REVIEW</u>

A. INTRODUCTION

To provide background on the primary and subsidiary research questions, it was necessary to review the current research literature on engineering management. Review of this research literature, coupled with extensive interviews conducted at NAC, provided a basis for the development of the surveys used in this thesis.

There is a consensus among the authors of the literature reviewed that engineering managers possess unique characteristics as a result of their technical backgrounds. They assert that this fact makes engineering management a distinct professional discipline--"different from engineering specialties and also different from general management" (Cleland, 1981, p. 3). The recent recognition of this fact has caused considerable attention to be paid to educating engineering managers, who play a dual role as the linkage between management and technical expertise. These managers have the responsibility of "allocating resources, working through people, and making and implementing decisions while simultaneously formulating technical strategies" (Cleland, 1981, p. 3). Badawy (1978, p. 37) suggests that engineer dissatisfaction frequently results from management's failure to recognize that:

...engineering is intrinsically creative and cannot be managed like other labor, that engineers are professionals who demand special treatment, and that the engineering environment is characterized by unknowns and uncertainties which mitigate close control.

According to the literature, e.g., Morrison (1986), Giegold (1982), Evans and Bredin (1987), the unique personal traits and learning styles that make individuals good engineers are precisely the same traits that could make the move to management difficult. Many engineers transition into management with inadequate preparation for the change in roles and an unrealistic view of what management entails. It is argued that the development of adequate training programs for engineering management positions begins with a thorough understanding of the traits and specific needs of engineers themselves, followed by the identification of those traits and behaviors that make engineering managers successful. This chapter will discuss the findings of recent studies that pertain to these areas.

B. ENGINEER--TRAITS

Some people believe that engineers have similar traits. The "typical technical employee is a high achiever, non-conforming, is low in guilt feelings and has lower needs for others" (Martin and Shell, 1980, p. 95). Holder, Shultz and Friel (1984) observed similarities in interests, learning styles and interpersonal behavior patterns among engineering populations. Engineers tend to hold more of an interest in "things and data" rather than in people. They, in general,

display a dissatisfaction with the status quo. They are more often found to be task oriented and to enjoy working on solutions to what they consider to be logical problems. Giegold (1982, p. 99) feels that, for most technical people, the "natural outlet is the creative solution of technical problems." Their fundamental learning style is what Holder, Shultz and Friel (1984, p. 61) call a "problem-reason-direction" format. They argue that this is the reason why most engineers are not attracted to management courses that deal with handling people--these courses are not structured in the same logical format to which they are accustomed.

Researchers contend that engineers usually deal with people in relation to how they can contribute to the task, paying little attention, if any, to any emotional factors that come into play. They quite often will say exactly what is on their mind. Holder, Shultz and Friel (1984) believe, as recent studies have shown, that engineers show little or no sensitivity to the manner in which their comments are received by others.

It is the consensus in the literature that the personal attributes mentioned above are common in engineers (and, thus, in engineers turned managers). It is deemed essential to the proper training of engineering managers that these attributes be considered. The authors were in agreement that it is quite possible for engineers to be successful managers.

C. ENGINEER--SPECIFIC PROFESSIONAL NEEDS

Researchers point out that the unique personal attributes outlined create certain professional needs for engineers, the fulfillment of which is necessary for satisfaction on the job. Responses to questionnaires by industrial engineers and scientists have indicated that over 50% of them believed they have needs that are different from those of other workers (Martin and Shell, 1980, p. 95). The literature outlined several specific professional needs engineers have expressed in terms of what they expect from their immediate supervisors. For one, an engineer expects his/her supervisor to be a person who:

- understands technical problems.

- is an effective sounding board for their technical ideas.

- can understand, explain, interpret and defend their proposals to higher levels of technical management.

- has an appreciation for the tools and support facilities needed to get the job done and who is a continual advocate for improvements in this area. (Giegold, 1982, p. 95)

Thamhain (1983) developed a hierarchy of specific professional needs expressed by engineering personnel in a study of 150 non-managerial engineering professionals, 120 engineering managers, and 35 senior engineering managers, all from 75 technology-oriented companies. These needs are listed in Table 2.1 in their order of importance for enabling individuals to perform effectively in their work

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TABLE 2.1

PROFESSIONAL NEEDS OF ENGINEERS (from Thamhain)

Needs	Definition
1. Interesting and Challenging Work	Work which is professionally stimulating and satisfying. Work which leads to an intrinsic motivation of the employee toward high engineering productivity and established objectives.
2. Professionally Stimulating Work Environment	A work environment which is professionally stimulating and challenging, fulfills the esteem needs of people such as recognition, accomplishment and pride; people are involved, motivated and interested in the work itself. The work environment is described by the structure of the organization, its facilities and mgmt style.
3. Professional Growth	The opportunity for continuous professional/career growth as indicated by promotions and salary advances as well as gained expertise and professional recognition.
4. Overall Leadership	Mgmt ability to lead engineering personnel toward established goals; assist in technical problem solving, team building, conflict resolution and grp decision making.
5. Tangible Rewards	Directly or indirectly rewarding an employee for job performance. Examples: salary increase, bonus, promotion, better office, educational opportunity.
6. Technical Expertise	All necessary interdisciplinary skills and expertise are available within the engineering team to perform the engineering task.
7. Assistance in Problem Solving	Assistance is expected from management in facilitating solutions to technical, administrative, or personal problems.
8. Clearly Defined Objectives	Goals, objectives and outcomes are clearly defined and communicated to all affected personnel.
9. Management Control	Management direction, control and leadership toward established engineering objectives, involving progress measurements and management actions for solving technical, budget or schedule problems.
10. Job Security	Stability of employment measured in both voluntary terminations and layoffs/firings. Also includes the ability to choose the type of work and location within an organization.
11. Senior Management Support	Senior mgmt support and commitment to specific engineering programs as indicated by provision of 1) financial resources 2) proper support personnel, equipment and facilities, 3) charter and direction, and 4)expressed interest and visibility.
12. Good Interpersonal Relations	Good working relations among engineering team members and supporting personnel. Minimum interpersonal conflict. Good team spirit.
13. Proper Planning	The availability of proper plans outlining what should be accomplished and how.
14. Clear Role Definition	Roles and responsibility of engineering personnel and their leaders is clear and unambiguously defined.
15. Open Communication	The free flow of information both horizontally and vertically, keeping employees informed of technical and organizational developments.
16. Minimizing Changes	Changes of established technical, business and organizational parameters are to be minimized. The need for change must be properly communicated. The participative style of managing change is preferred by personnel.

environment. Figure 2-1 shows a graphical summary of the data and the percentage of engineering personnel who described the 16 needs as very important. Seventy percent of the engineers surveyed indicated a strong need for work that is stimulating and satisfying. Sixty five percent supported the importance of a challenging work environment-- one that will fulfill the engineers' esteem needs through recognition, pride and involvement. The highest percentages of responses were needs related specifically to the task and the task environment--the engineers deemed it most important to have the means available to accomplish the established goals. Those needs that received the smallest percentages were related to managerial support, interpersonal relations, role definition and communication.

Badawy (1978, p. 41) suggested that "engineers place greater value on the psychological meaningfulness of their work rather than the economic significance." He says that engineers generally desire a strong voice in the decision making process and are not content with routine, unchalleng- ing jobs.

Zachary (1984, p. 39 took the analysis one step further, outlining what he determined to be the five most prominent demotivators of engineers. They are:

- Arbitrary assignment of tasks without consultation/ negotiation.

- Lack of opportunity to exercise one's own expertise.

Percentage Of Engineering Personnel Who Classify the
Specific Needs as "Very Important"

Need Category	Percentage
1. Interesting & Challenging Work	70
2. Professionally Stimulating Environment	65
3. Professional Growth	62
4. Overall Leadership	58
5. Tangible Rewards	55
6. Technical Expertise	50
7. Assistance in Problem Solving	48
8. Clearly Defined Objectives	45
9. Management Control	44
10. Job Security	42
11. Senior Management Support	40
12. Good Interpersonal Relations	35
13. Proper Planning	32
14. Clear Role Definition	30
15. Open Communication	25
16. Minimum Changes	15

Figure 2-1 Percentage of Engineer's Professional Needs
(FROM THAMHAIN)

- Inequitable distribution of labor--leader plays favorites; leader not contributing fair share.

- Failure of others to listen to or understand one's ideas.

- Lack of clarity concerning project goals, the framework for accomplishing them and the roles of the team members.

D. STRESSORS

Another approach, used by Saleh and DeSai (1986), involved the Stress Diagnostic Survey (SDS), which was given to 249 male engineers to identify those "stressors" that ranked high among them. "Stressors" were described as either macro- or micro-stressors. Those stressors related to the general work environment of the organization were called "macrostressors" and those related to the individual's job were "microstressors." The stressors used in the SDS are described in Table 2.2.

TABLE 2.2

STRESSORS USED IN THE SDS (Saleh & Desai)

MACROSTRESSORS

1) Politics: power play to enhance personal advancement;

2) Human Resource Development: lack of adequate training and development opportunities;

3) Rewards: unfair reward system where the rewards are not related to performance;

4) Participation: lack of opportunity to participate in decision-making;

5) Underutilization: lack of challenge and the full use of abilities and skills;

6) Supervisory Style: supervisors not concerned with subordinates' needs;

7) Organization Structure: restrictive policies, unclear chain of command, confusing structure.

MICROSTRESSORS

1) Role Ambiguity: lack of defined objectives, expectations and scope of responsibilities;

2) Role Conflict: receiving incompatible requests to do some job related activity;

3) Quantitative Overload: having too many things to do;

4) Qualitative Overload: having job assignments that are too complex to do well;

5) Career Progress: not having enough opportunities to advance;

6) Responsibility for People: being accountable for the work of others and being unable to help them;

7) Time pressure: having to meet many tight deadlines;

8) Job Scope: lack of variety and importance of job duties; lack of feedback.

Table 2.3 illustrates the ranking of these stressors among four different job levels.

TABLE 2.3

RANK ORDER OF STRESS CATEGORIES FOR TOTAL
SAMPLE AND JOB LEVEL (Saleh & Desai)

	Total Sample	Non-Supervisors	1st Level Supervisors	2nd Level Supervisors	3rd Level Supervisors
Politics	6	5	6	4	7
Under Utilization	5	3	5	7	5
Human Resources Development	3	4	3	2	3
Supervisory Style	7	6	7	8	8
Rewards	1	1	1	1	4
Organization Structure	9	9	9	10	10
Participation	4	2	4	5	6
Role Ambiguity	13	10	13	12	14
Overload/Qualitative	15	15	15	15	15
Overload/Quantitative	8	12	8	6	2
Time Pressure	2	8	2	3	1
Role conflict	12	13	10	13	10
Career Progression	10	7	10	9	13
Job Scope	11	11	12	14	11
Responsibility for People	14	14	14	11	9

It is interesting to note that rewards, as defined in Table 2.2, ranked #1 in three of those levels, making it the highest ranking stressor for the total sample. This ranking indicates that a reward system that is viewed as "unfair"

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(i.e., does not use performance as its primary basis) is the most unsatisfying and stressful aspect of the engineers' environment. Time pressure came in second overall, ranking very high among all levels of supervisors. Figure 2-2 summarizes the significance of stress at different job levels determined from the study.

E. THE TRANSITION TO MANAGEMENT

In the literature reviewed, many authors agree that some engineers are awarded managerial positions without being properly evaluated as to their level of development of managerial qualities. Giegold (1982, p. 95) notes that:

> ...many technical managers are awarded their first administrative job solely because of their technical expertise...or as a reward...particularly in those firms which cannot reward technologists beyond a certain salary level without a promotion into management.

Giegold is one of many authors who agree that "management is no place for a person whose only reason for being there is the notion that it represents a reward in terms of status or salary" (Giegold, 1982, p. 99).

Mandt (1984), in developing a model for manager development, described those skills, originally identified by Katz (1955), that he deemed necessary for management at three levels (Figure 2.3). The three broad categories of skills are:

- Technical and Professional: includes the knowledge, methods and techniques, as well as the ability to use them in the area in which the employee works.

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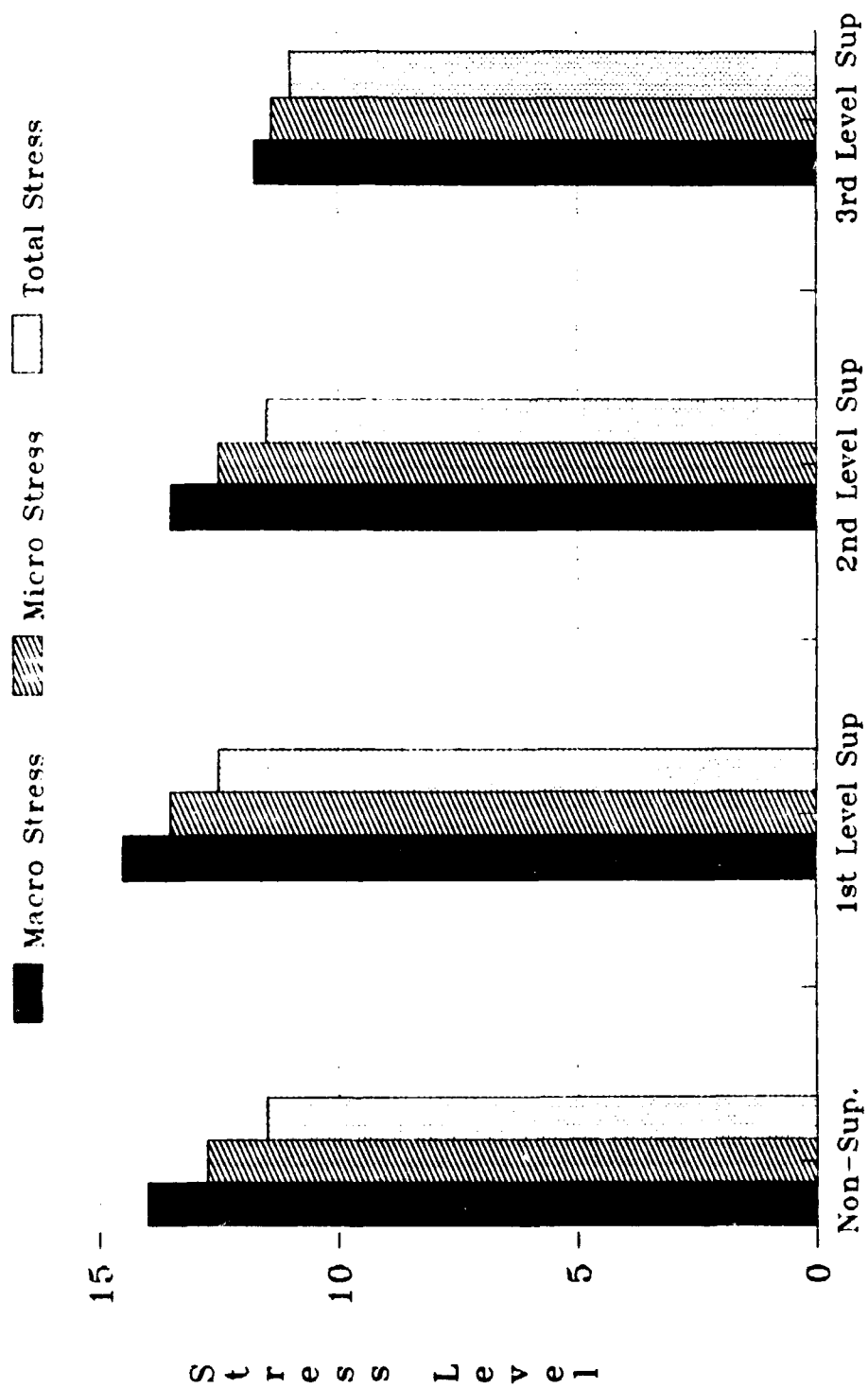
Figure 2-2 Summary of Stress Levels (Saleh & Desai)

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Levels of Mgmt

	Managerial & Administrative		
Top		Interpersonal	
Middle			Technical & Professional
Supervisory			
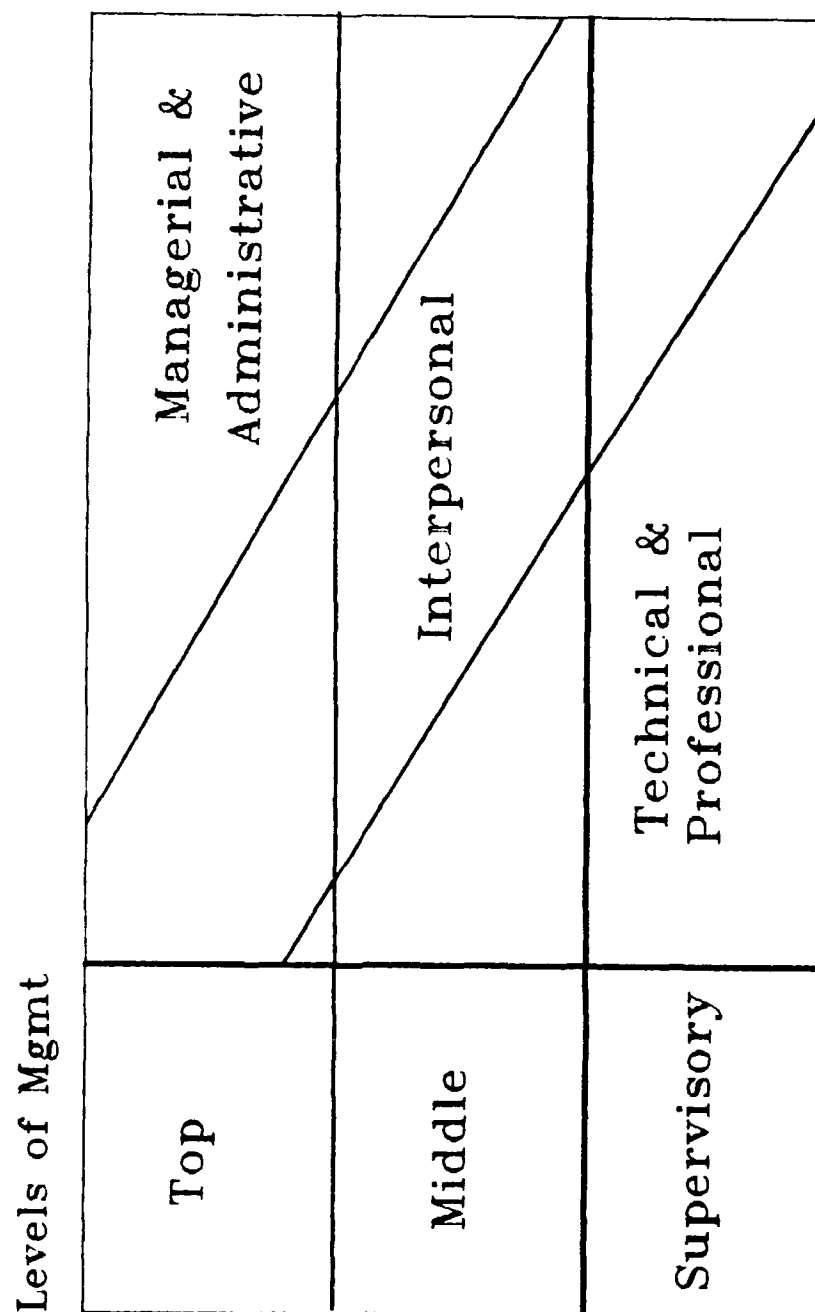
Figure 2-3 Skills Needed (Mandt)

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- <u>Interpersonal</u>: understanding of motivation, effective-ness of relationships with co-workers, sensitivity, communications.

- <u>Managerial and Administrative</u>: understanding the complexities of the organization, ability to set objectives and goals, problem solving and controlling results. (Mandt, 1984, p. 55)

Mandt concluded that as an employee moves up the chain and he/she begins mastering the professional and technical skills, a need develops for expertise in managerial and administrative skills. For instance, a supervisor initially learns about "work management, work simplification, and quality control (technical skills) before he/she begins setting goals and monitoring results (managerial and administrative skills)" (Mandt, 1984, p. 56).

Morrison (1986) discovered that the major dilemmas in making the transition from engineer to manager are inherent in the differences between the two roles. Dorman (1988, p. 291) quoted Wills (1981) in saying "the most important qualification for those who have moved from engineering to management is being able to learn the differences between formulas and feelings."

Morrison (1986, p. 259) conducted a study of engineering managers to find out what helped, as well as hindered them in their transition from engineer to manager. Those traits developed from an engineering background that engineers felt helped them were:

- They are logical, methodical, objective, and make unemotional decisions based on facts.

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- They use their technical knowledge to check the validity of information.

- They can analyze problems thoroughly, look beyond the immediate ones, and ask good questions to explore alternative solutions to technical problems.

- They understand what motivates engineers.

- They can review and evaluate the work of their subordinates because they understand what they are doing.

- They can engage in future planning with appropriate consideration for technology and its relationship to cost effectiveness.

- Engineering background helps in technical discussions with customers.

- The engineering background increases the manager's credibility with subordinates, customers, and superiors. People attribute qualities, skills and knowledge to them, which allows the manager to influence those who have that perception.

In terms of hindrances to the transition from engineer to manager, Morrison (1984, p. 260) discovered that problems often occur because engineers do not have the "proper expectations of their new role, its breadth, organizational priorities, and established procedures to help them fill their new role successfully." She also noted that a second major transition problem among engineers is poor interpersonal skills, such as a lack of rapport with people, proper delegation, effective communication of management's goals and not providing a bridge between management and subordinates.

Gibson (1981), cited by Evans and Bredin (1987), outlined those engineering traits he feels are managerial

drawbacks. Table 2.4 suggests that engineers would have to make a significant transition, with regard to their approach to tasks, to be successful as a manager.

TABLE 2.4

ENGINEERS' TRAITS NOT CONDUCIVE TO MGMT (Gibson)

structured

linear

thing vs. people oriented

specialist vs. generalist

rigid

low tolerance for ambiguity

perfectionist

Should a new engineering manager fail to succeed, Badawy (1981) states that it is necessary to understand the specific causes of that failure. He segregates the causes of managerial failure among engineers into two categories:

- Personal Factors--interpersonal skills, inability to delegate, lack of motivation to manage.

- Job-Related Factors--inability to: adjust to new position; exercise power; balance objectives and priorities.

F. THE SUCCESSFUL ENGINEERING MANAGER--TRAITS AND BEHAVIORS

Evans and Bredin (1987, p. 220) contend that the "good engineering manager is distinguished from other good managers by the fact that he/she simultaneously uses an ability to apply engineering principles and a skill in organizing and

directing resources, projects and people." There appeared to
be a consensus in the literature along these lines, as well as
a consensus about the qualities that seem to characterize
successful engineering managers. Morrison's (1986) list of 14
qualities of successful engineering managers was the most
thorough and served to summarize the ideas of the other
authors. According to Morrison, the successful engineering
manager:

- Has a broad view of the organization, understands
  organizational goals as well as the interdependence of
  the many subsystems of the organization. In making
  decisions, he/she takes into account the impact of
  decisions on other units of the organization as well as
  the fit between his/her decisions and organizational
  priorities.

- Understands who to influence to sell an idea and utilizes
  appropriate strategies to influence others.

- Values openness and honesty and applies it in his/her
  work life.

- Can readily identify his/her own strengths that
  contribute to effectiveness as a manager.

- Is a risk taker in making decisions under conditions of
  uncertainty that usually result in positive outcomes for
  the organization.

- Finds the rewards of his/her role are: 1) having the
  responsibility and authority to plan; 2) implementing
  plans successfully by getting people to work together as
  a team to accomplish goals; and 3) seeing people grow and
  new business develop.

- Applies problem solving, logic and analytical skills in
  the role of manager.

- Has experience in several functions in the organization.

- Reaches higher levels of management through visibility
  for major accomplishments valued by the organization.

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- Is upwardly mobile and seldom occupies one position for more than four years.

- Is conscious of the role differences between engineers and managers and has successfully learned appropriate behaviors as a manager.

- Is interpersonally competent: relates well to people, is articulate, listens well, manages conflict effectively, negotiates issues successfully, has the respect of subordinates, peers, bosses and customers, and communicates clearly.

- Delegates appropriately depending on the task and the person and then follows up.

- Applies technical knowledge to monitor work of the organization and to plan for the future direction of the organization.

Dorman (1988) adds, as a result of a study, that there are striking similarities among top managers, including:

- They do not hold "trials" to place blame on subordinates.

- They mentally rehearse upcoming events.

- They know when to reject perfectionism in favor of action.

- They balance direction of subordinates with subordinate independence by providing training and goals, while avoiding dictating how to meet goals.

Zachary (1984) believes managing engineers requires special skills. In a high-tech, project-oriented engineering environment, he claims there are certain behaviors that are highly correlated with effective management. He says that engineering managers should:

- Conduct a values analysis--identify, interpret and forecast values (when research goals are vague, the impact of individual values on behavioral outcomes increases). Zachary notes that the high-tech leader often ignores this, with negative impact.

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- Have one-on-one talks and group discussions for two-way feedback, being careful that talks are not perceived as tests of loyalty to the leader's values rather than open interchange.

- Concentrate on interpersonal matters rather than focus completely on the technical (avoid "engineering myopia").

- Show concern for people by encouraging participation in the decision-making process. He says engineers are frustrated by the "strong" manager.

- Practice a "hands-off" style of leadership.

- Build a team feeling without communicating excessively. He indicates this requires: 1) knowing the research issue; 2) having a good feel for the direction in which the project is headed; 3) possessing a highly developed sense of timing; and 4) displaying much interpersonal finesse. (Zachary, 1984, p. 39)

Zachary adds that the "technical communication the leader does contribute must have a strong, positive impact" (Zachary, 1984, p. 38).

Holder, Shultz and Friel (1984) found that the most successful high-technology companies had top management that supported a "participative" management style. The results of their survey pointed out that a "participative management style (Give, Get, Merge, Go) was found to be more functional than the traditional autocratic style (Give and Go)" (Holder, Shultz and Friel, 1984, p. 59).

Overall, there is significant consensus when it comes to the nature and complexity of engineering management. Thamhain (1983) summed the ideas of many when he claimed that effectiveness would be achieved when the engineering manager develops "an understanding of the interdependencies among

organization, human and task variables" (Thamhain, 1983, p. 231). He noted that, internally, the engineer must "be able to operate in a multi-disciplinary environment which requires dealing effectively with a variety of interfaces and support personnel over whom he/she has little or no control." He goes on to add that, externally, the "engineer manager has to cope with constant and rapid change regarding the technology, markets, regulations and socioeconomic factors" (Thamhain, 1983, p. 231).

III. <u>METHODOLOGY</u>

A. SUBJECTS

The subjects analyzed in this thesis were from the 800 (Systems Technology) and 900 (Systems and Engineering) departments. The department mission statements are provided in Appendix B. As noted earlier, these two departments were chosen because they contain the largest concentration of engineers in the Naval Avionics Center. Furthermore, engineers in these two departments constitute a relatively homogeneous study population in that they perform similar project engineering work.

B. PRELIMINARY INTERVIEWS

Twenty-nine semi-structured confidential interviews of NAC engineering managers and engineers were conducted. Each interview lasted from 30 to 60 minutes. The following is a breakdown of the personnel interviewed:

- 2 Department Heads.
- 3 Division Directors.
- 5 Branch Managers.
- 19 Engineers.

The main purpose of these interviews was to generate a list of criteria for identifying effective engineering managers at the Naval Avionics Center and to identify

aspects of managerial behavior believed to make engineering managers more effective at NAC. These criteria and behaviors were used, along with findings from the literature review, to design questionnaires for the main part of the study. A secondary purpose was to better understand the engineering work environment and collect information that would help interpret the results of the questionnaire study.

A list of interview questions is contained in Appendix C. Appendix D contains a list of characteristics of effective engineering managers mentioned by at least two interviewees.

C. QUESTIONNAIRE DESIGN

As part of a larger study, two separate questionnaires were designed to evaluate subordinate perceptions of managerial behaviors and managerial effectiveness of branch managers (first level of engineering management) and division directors (second level management). Ratings from immediate superiors were also obtained on the effectiveness of branch managers and division directors. This thesis will focus on that portion of the study that involves the effectiveness of branch managers. Specifically, it will focus on questionnaire data from the engineers and scientists (subordinates) within a branch. (Subsequent theses and technical reports will analyze other portions of

the data, including ratings from superiors. (See "Recommendations for Further Research" in Chapter V.)

Based on the literature review and preliminary interviews, the survey questions were either written as original items or taken from previous studies. These items were arranged into five sections, as follows:

- Section I--Background Information (11 items).
- Section II--Managerial Behavior (67 items).
- Section III--Branch Climate (30 items).
- Section IV--Feelings About Work (44 items).
- Section V--Ways of Thinking (26 items).

The complete questionnaire is shown in Appendix E.

Of the five sections, Sections II, III and IV are most directly related to this report. Section II contained questions regarding engineers' perceptions of specific aspects of their branch manager's behavior. Also included in this section were three questions to assess the engineers' general ratings of their manager's overall effectiveness. Sections III and IV contained questions about variables related to individual and branch performance that could be influenced by the manager's behavior. These two sections, then, were intended to measure specific elements of managerial effectiveness. Survey respondents were asked to answer each question using a 7-point Likert-type format where 1 equals strongly disagree and 7 equals strongly agree.

D. QUESTIONNAIRE DISTRIBUTION AND RESPONSE RATE

The questionnaires were distributed by the Civilian Personnel Department (Code 500) to engineers and scientists in the 800 and 900 departments. The questionnaires were completely confidential. They were not serialized to ensure confidentiality. The respondents were provided a manila envelope and asked to return the sealed, completed questionnaires to the Civilian Personnel department. The sealed questionnaires were then sent back to the Naval Postgraduate School for statistical processing.

Of the 631 questionnaires distributed to the engineering managers and engineers in the 800 and 900 departments, 556 questionnaires were given to engineers. Of the 556 questionnaires disseminated to engineers, 389 were returned, representing a 69% response rate. Of this total, four questionnaires were not adequately completed and thus were deleted from this analysis.

E. STATISTICAL DATA ANALYSIS

The data from the questionnaires were manually entered into a data base and statistically analyzed using SPSS statistical software.

1. Data Reduction

The general strategy was to identify a small number of variables that were measures of effectiveness. To do this it was necessary to reduce a larger number of items to

a small number of scaled variables representing outcome
indicators of effectiveness. At the same time, it was
decided to treat the managerial behaviors as discrete items
in order to determine a profile of behaviors that were
related to the effectiveness variables.

Thus, the first data analysis task was to combine the
large number of questionnaire items into a smaller number of
scaled "effectiveness variables" that would serve as
indicators of effective management behavior. First, a
priori clusters of items were formed that were believed to
measure the same concept (e.g., stress). Then reliability
coefficients (Cronbach's Alpha) were calculated to measure
the internal consistency of these clusters of items. For
the most part, the resulting coefficient, Cronbach's Alpha,
was satisfactory for these clusters. However, in some
cases, the scale constructions did not demonstrate
satisfactory reliability, and some scale modifications were
indicated. Given this, and in the interest of parsimony,
factor analysis was used to explore the possible reduction
in number of distinctive indicators of effectiveness.

The above analyses, together with a priori scale
intercorrelations led to the final scaled constructions for
evaluating managerial effectiveness shown in Table 3.1.
This table also shows the internal consistency coefficients
(Cronbach's Alpha) for these variables. These coefficients
are quite high, indicating that the individual items that

TABLE 3.1

FINAL SEVEN EFFECTIVENESS VARIABLES

Effectiveness Variable	Alpha Coefficient
General Managerial Effectiveness	.98
Intrinsic Task Motivation	.97
Job Satisfaction	.91
Positive Work Climate	.96
Group Problems	.83
Intention to Leave	.93
Stress	.86

make up each effectiveness variable are measuring the same
concept. A complete list of questionnaire items that were
used for each effectiveness variable is shown in Appendix F.
All further analysis involving the effectiveness variables
used scales created by adding together an individual's
ratings on items comprising that measure and dividing by the
number of items.

Following these procedures, the Engineer/Scientist
questionnaire data was consolidated into a data file for
each branch. Files were created for each branch that had at
least two engineers respond for that branch. Engineers must
have worked for at least one month in the branch to be
included in the branch file. This yielded a file for 48
branches. Within the branch files, the responses of
engineers in each branch were averaged to provide a

consolidated response for each effectiveness variable. The
branch file also contained the average responses for each
item in the managerial behavior section. As noted earlier,
these items were not combined into scaled variables but were
left as discrete indicators of managerial behaviors.

2. Data Analysis

The relationship between managerial behavior
variables and the effectiveness variables is the substantive
focus of this study. The Pearson correlation coefficient
was used to determine the degree of correlation between the
effectiveness variables and specific managerial behaviors.
These results, in addition to a brief analysis of the
effectiveness variables, will be presented in Chapter IV.

IV. RESULTS

A. THE STATE OF MANAGERIAL EFFECTIVENESS AT NAC

Before examining how specific managerial behaviors impact the derived effectiveness variables, it is useful to see what these effectiveness variables say about the "state of affairs" at NAC. Table 4.1 lists the mean responses and standard deviations for each effectiveness variable.

TABLE 4.1

MEAN RESPONSES[1] FOR EFFECTIVENESS VARIABLES
(EACH DEPARTMENT AND OVERALL)

	800 Dept (n=23 branches)	900 Dept (n=25 branches)	Overall (n=48 branches)
1 General Managerial Effectiveness	5.22 (.79)[2]	4.79 (1.09)	4.99 (.97)
2 Intrinsic Task Motivation	5.33 (.36)	5.30 (.51)	5.32 (.44)
3 Group Problems	3.47 (.73)	3.50 (.59)	3.48 (.65)
4 Positive Working Climate	4.86 (.50)	4.77 (.48)	4.81 (.49)
5 Stress	3.19 (.36)	3.32 (.33)	3.25 (.34)
6 Job Satisfaction	4.39 (.57)	4.49 (.71)	4.44 (.64)
7 Intention to Leave	3.12 (.61)	3.11 (1.09)	3.12 (.89)

[1]Means are based on a scale of 1 to 7, with 1 = low ratings and 7 = high ratings on each variable.

[2]Standard deviations are presented in parentheses.

Mean scores on the effectiveness variables for the 800 and 900 departments are shown in Table 4.1. Inspection shows negligible differences between the departments on these variables. Two-tailed t-tests failed to indicate any statistically significant differences (p <. 05). T-tests also showed no statistically significant differences in mean responses between departments on any of the managerial behavior questionnaire items. Because the two departments are not significantly different on these variables, further analysis of the data was conducted using combined data for both departments.

The survey data cannot indicate with certainty that the mean response levels are high or low in comparison with other organizations. However, the mean responses can be analyzed with respect to their position relative to the midpoint of the response scale. The midpoint of the scale was "4" for all questions, with endpoints indicating either strong disagreement ("1") or strong agreement ("7").

Referring to Table 4.1, four of the seven effectiveness variables had means above the midpoint--general rating of managerial effectiveness, intrinsic task motivation, positive work climate and job satisfaction. The means for group problems, intentions to leave and stress were all below the midpoint. In other words, respondents tended to agree with those statements indicating a general rating of managerial effectiveness, intrinsic task motivation,

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positive working climate and job satisfaction (mean
responses .99, 1.32, .29, .56 above the midpoint,
respectively). Likewise, respondents tended to disagree
with those statements indicating group problems, intention
to leave and stress (mean responses .52, .88,and .75 below
the midpoint, respectively). Overall then, responses tended
to indicate a desirable state of affairs at NAC. However,
the means also indicate that there is room for improvement.

Table 4.2 provides another indication of how managerial
effectiveness is perceived at the branch level. This table
gives the response distributions for the item (MB67) that
most directly measures the perceived effectiveness of branch
managers. The majority of the respondents (68%) rated their
managers between "quite effective" and "extremely
effective." Less than one third (32%) rated their managers
as less than "quite effective."

TABLE 4.2

RESPONSE DISTRIBUTION FOR OVERALL EFFECTIVENESS
RATING OF BRANCH MANAGER (N=368)

MB67. Provide an overall rating of the effectiveness of your branch manager.							
	[1]	[2]	[3]	[4]	[5]	[6]	[7]
	Not at all effective		Somewhat effective		Quite effective		Extremely effective
No. Responses	11	17	38	53	104	117	28
Percent	3.0	4.6	10.3	14.4	28.3	31.8	7.6

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B. RELATIONSHIPS AMONG THE EFFECTIVENESS VARIABLES

Table 4.3 shows correlations among the seven effectiveness variables. (Correlations shown are Pearson product-moment correlation coefficients. Probabilities are two-tailed.) Examination of these correlations indicates that the final set of effectiveness variables are, in fact, separate concepts that should be addressed individually.

TABLE 4.3

CORRELATIONS BETWEEN EFFECTIVENESS VARIABLES

	1	2	3	4	5	6	7
1 Managerial Effectiveness	-----						
2 Intrinsic Task Motivation	.56**	-----					
3 Group Problems	-.32*	-.30*	-----				
4 Positive Working Climate	.46**	.56**	-.66**	-----			
5 Stress	-.29*	-.37*	.41*	-.43*	-----		
6 Job Satisfaction	.47**	.83**	-.35*	.57**	-.28*	-----	
7 Intention to Leave	-.41*	-.68**	.13	-.26	.26	-.67**	----

* p < .05 Level of Significance

** p < .001 Level of Significance

Figure 4-1 portrays the strongest relationships between the effectiveness variables. Only correlations significant at the p = .001 level of statistical significance are shown. The purpose of this figure is to identify the subset of effectiveness variables that will best serve as criteria for

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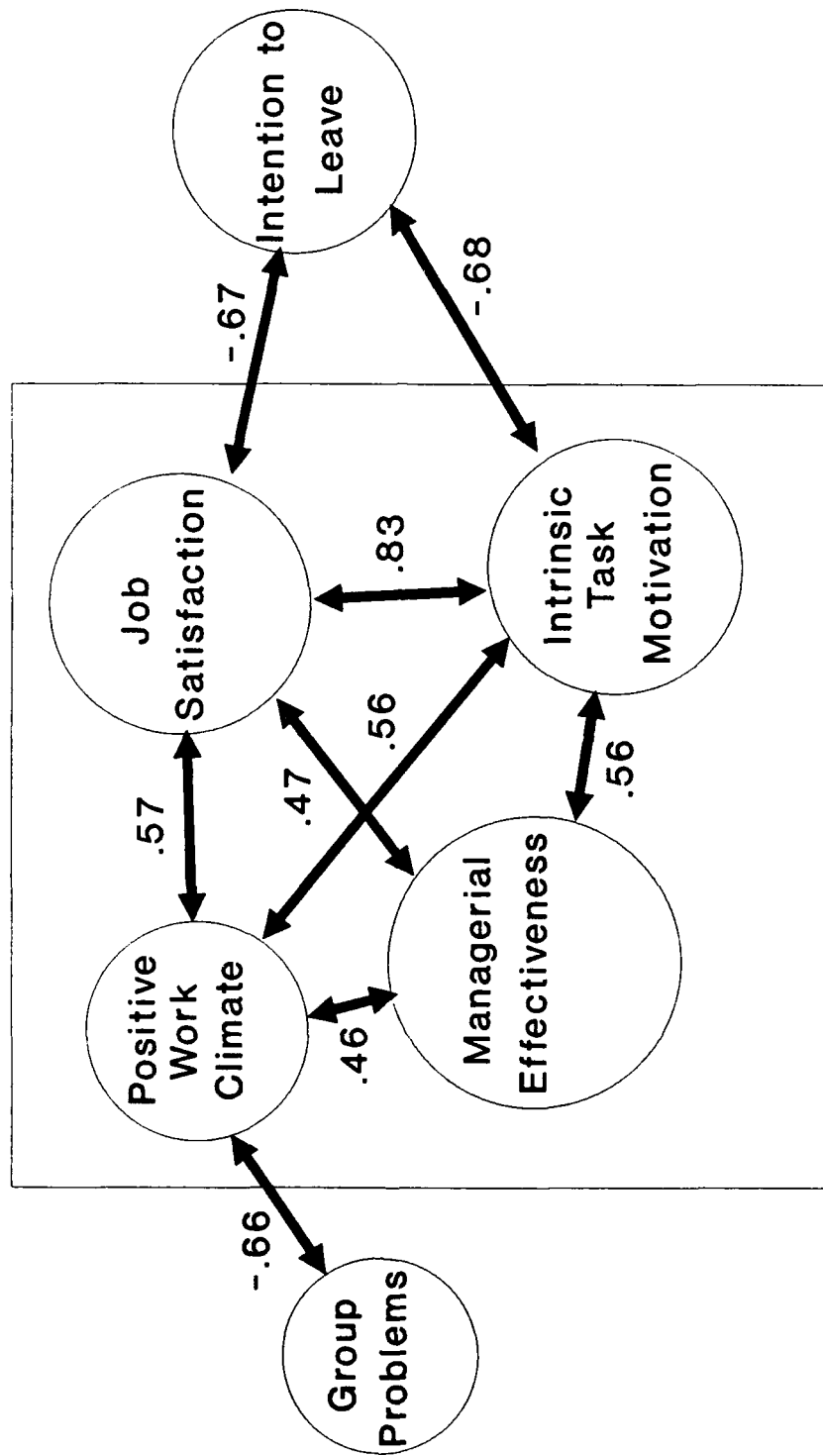
Figure 4-1 Correlations among Effectiveness Variables (at p=.001)

managerial effectiveness. The four variables inside the box are more centrally interconnected than are the others and were selected for this purpose. These four variables are intrinsic task motivation, job satisfaction, positive working climate and engineers' general rating of managerial effectiveness. Of the remaining effectiveness variables, only "stress" did not correlate with any others. Also "group problems" and "intention to leave" did not correlate with the overall rating of "managerial effectiveness" variable as strongly (p < .001) as did job satisfaction, intrinsic task motivation and positive working climate. The results indicate that branch managers rated as more managerially effective also tend to have branches with higher intrinsic task motivation and job satisfaction and with a more positive working climate.

As shown in Figure 4-1, these three outcome variables that correlate significantly with the general rating of managerial effectiveness are also significantly (p <. 001) correlated with each other. The highest correlation (.83) is between intrinsic task motivation and job satisfaction. This indicates that engineers' job satisfaction is very positively related to the rewards they derive from the work itself.

C. MANAGERIAL BEHAVIORS RELATED TO THE EFFECTIVENESS
    MEASURES

Briefly, our results indicate that, from an engineer's viewpoint effective managerial behavior can be broken down into two categories: 1) how they want to be treated, and 2) what they want to happen. The former is related to the subordinates' general evaluation of "managerial effectiveness," the latter with their perception of intrinsic task motivation, job satisfaction and positive working climate. These two concepts are discussed in this section.

1. Managerial Behaviors Related to General Ratings
    of "Managerial Effectiveness"

Table 4.4 shows the 15 managerial behaviors that correlated most strongly with subordinates' general rating of managerial effectiveness. These managerial behaviors tended to deal primarily with direct interpersonal relations between the manager and the engineer--with how the manager treats subordinates. Managerial effectiveness highly correlated with behaviors relating to recognition, consideration, feedback and guidance. Thus, the engineers' general evaluation of their manager appears to be a measure of their satisfaction with their leader, which, in turn, seems to be influenced primarily by how they are treated and how well they "like" their boss.

TABLE 4.4

MANAGERIAL BEHAVIORS MOST STRONGLY CORRELATED WITH ENGINEERS' GENERAL RATING OF MANAGERIAL EFFECTIVENESS

Managerial Behavior	Correlation Coefficient
1. Lets us know the significance of what we are doing. (MB10)	.90
2. Provides a sense of direction for this branch. (MB49)	.88
3. Provides helpful feedback. (MB57)	.88
4. Is an effective teacher. (MB64)	.88
5. Pushes ahead in a positive manner. (MB38)	.87
6. Treats me with respect. (MB30)	.86
7. Gives subordinates clear guidance. (MB61)	.86
8. Implements subordinate's ideas. (MB51)	.86
9. Gives us credit for our successes. (MB66)	.86
10. Is sensitive to my needs and desires. (MB9)	.85
11. Promotes teamwork within our branch. (MB6)	.85
12. Genuinely cares about subordinates. (MB48)	.85
13. Keeps us informed of possible surprises/roadblocks. (MB52)	.84
14. Helps us feel good about our achievements. (MB65)	.83
15. Helps us develop ideas. (MB58)	.83

2. **Managerial Behaviors Related to Three Primary Outcome Variables**

Tables 4.5 through 4.7 list the ten managerial behaviors that correlate most highly with the three outcome variables of intrinsic task motivation, job satisfaction and positive work climate, respectively. (Managerial behaviors correlated with the remaining outcome variables are included in Appendix G.) A high degree of overlap exists among these three lists and notably little overlap exists with the items in Table 4.4. The managerial behaviors that are related to all three of these outcome variables are shown at the top of Table 4.8. The bottom portion of Table 4.8 shows the managerial behaviors that correlated with two of the three outcome variables. In general, the behaviors associated with the outcome variables have to do with how the manager "runs the system." They deal with "setting up" the system (e.g., making task assignments), managing system interfaces with other parts of the organization, and supporting task accomplishment through promoting teamwork, implementing subordinates' ideas and keeping things on schedule. Thus, these behaviors tend to be descriptive of what the engineer wants to happen. These results indicate that engineers want the managers to create a set of enabling conditions that involve the management and steering of the system, to allow them to achieve project effectiveness.

TABLE 4.5

MANAGERIAL BEHAVIORS MOST STRONGLY CORRELATED
WITH INTRINSIC TASK MOTIVATION

Managerial Behavior	Correlation Coefficient
1. Runs interference for us in dealing with top management and other units. (MB37)	.67
2. Protects the branch from unnecessary hassles and interruptions. (MB20)	.57
3. Treats me with respect. (MB30)	.57
4. Stands up for subordinates when it counts. (MB14)	.56
5. Assigns career development opportunities based on individual performance. (MB25)	.55
6. Assigns tasks and projects appropriately, based on subordinates' skills and limitations. (MB22)	.55
7. Gives recognition for superior performance. (MB29)	.54
8. Guides subordinates' career development. (MB18)	.54
9. Assigns work equitably. (MB39)	.54
10. Keeps us on schedule. (MB19)	.52

TABLE 4.6

MANAGERIAL BEHAVIORS MOST STRONGLY CORRELATED
WITH JOB SATISFACTION

Managerial Behavior	Correlation Coefficient
1. Runs interference for us in dealing with top management and other units. (MB37)	.63
2. Assigns career development opportunities based on individual performance. (MB25)	.55
3. Guides subordinates' career development.(MB18)	.51
4. Protects the branch from unnecessary hassles and interruptions.(MB20)	.48
5. Keeps us informed of the long-term aims of the organization.(MB31)	.48
6. Promotes teamwork within our branch. (MB6)	.46
7. Assigns tasks and projects appropriately based on subordinates' skills and limitations. (MB22)	.46
8. Implements subordinates' ideas.(MB51)	.46
9. Gives recognition for superior performance.(MB29)	.45
10. Keeps us on schedule. (MB19)	.45

TABLE 4.7

MANAGERIAL BEHAVIORS MOST STRONGLY CORRELATED
WITH POSITIVE WORKING CLIMATE

Managerial Behavior	Correlation Coefficient
1. Runs interference for us in dealing with top management and other units.(MB37)	.63
2. Assigns work equitably. (MB39)	.60
3. Assigns tasks and projects appropriately,based on subordinates' skills and limitations.(MB22)	.59
4. Implements subordinates' ideas. (MB51)	.57
5. Promotes teamwork within our branch. (MB6)	.54
6. Keeps us on schedule. (MB19)	.54
7. Emphasizes cooperation between branch members.(MB33)	.53
8. Has confidence in subordinates.(MB56)	.51
9. Looks for improved ways of doing things. (MB11)	.51
10. Gives subordinates an inspiring idea of what is possible.(MB35)	.50

TABLE 4.8

SUMMARY OF MANAGERIAL BEHAVIORS CORRELATING MOST STRONGLY WITH OUTCOME VARIABLES

Managerial Behavior	Outcome Variable Correlated with
I. Correlated with all three variables	
Keeps us on schedule (MB19)	Intrinsic Task Motivation, Job Satisfaction, Positive Working Climate
Assigns tasks and projects appropriately, based on subordinates'skills and limitations. (MB22)	Intrinsic Task Motivation, Job Satisfaction, Positive Working Climate
Runs interference for us in dealing with top management and other units.(MB37)	Intrinsic Task Motivation, Job Satisfaction, Positive Working climate
II. Correlated with two variables	
Assigns career development opportunities based on individual performance.(MB25)	Intrinsic Task Motivation, Job Satisfaction
Guides subordinates' career development.(MB18)	Intrinsic Task Motivation, Job Satisfaction
Protects the branch from unnecessary hassles and interruptions. (MB20)	Intrinsic Task Motivation, Job Satisfaction
Promotes teamwork within our branch.(MB6)	Job Satisfaction, Positive Working Climate
Implements subordinates' ideas.(MB51)	Job Satisfaction, Positive Working Climate
Gives recognition for superior performance.(MB29)	Intrinsic Task Motivation, Job Satisfaction
Assigns work equitably.(MB39)	Intrinsic Task Motivation, Positive Working Climate

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V. CONCLUSIONS AND RECOMMENDATIONS

A. SUMMARY OF FINDINGS

The analysis of engineers' perception of managerial behaviors at the Naval Avionics Center provides some useful insight for developing a profile of an effective engineering manager. The finding that the two departments' (800 and 900) responses were not statistically different supported the notion, as seen in the literature, that engineers possess similar professional needs and expectations.

In general, the managers at NAC are deemed to be quite effective. The results show that managers who are deemed more effective also tend to have engineers who have high intrinsic task motivation, high job satisfaction, and who experience a positive working climate in their branch. Job satisfaction is strongly correlated positively to the engineers' level of intrinsic task motivation. This finding supports the literature claim that engineers are motivated by interesting and challenging work and a stimulating professional environment (e.g., Thamhain, 1983).

Although ratings of general managerial effectiveness are correlated with positive outcomes (e.g., job satisfaction, intrinsic task motivation, positive work climate), engineers associate different managerial behaviors with these two types of criteria. The results indicate some degree of

perceptual separation of "boss" from "task" by engineers.
The general rating of their manager's effectiveness appear
more closely related to the personal relationship between
the manager and engineers, while job satisfaction, intrinsic
task motivation and positive work climate are more closely
related to how the manager manages the system to get the job
done.

B. IMPLICATIONS FOR NAC

The results of this study can be used by the Naval
Avionics Center Institute in the Management Development and
Management Excellence Programs. A major focus of NACI's use
of the results can be in training NAC managers and manager
selectees.

Specifically, the results suggest two major categories
that contribute to positive organizational outcomes. First,
engineers evaluate general managerial effectiveness in terms
of how the branch manager relates to them personally and
professionally (e.g., respect, consideration, feedback,
recognition and learning). However, a different set of
managerial behaviors were found to relate to the outcomes of
job satisfaction, intrinsic task motivation and positive
work climate. These behaviors focus on the management of
the system (rather than the individual relationship
described above) and include such enabling actions as
promoting teamwork, implementing subordinates' ideas and

recognizing subordinates' achievements. By incorporating these findings into the NACI programs, both managers and managerial selectees can develop an enhanced understanding of the behaviors that contribute to increasing managerial and organizational effectiveness.

Since the focus of this study was directed toward the subordinates' view of effectiveness in branch managers, the results do not portray the complete picture of an effective engineering manager. Without the ratings from superiors, the results should be used with caution in determining selection or evaluation criteria for managers. However, NACI's use of this profile can be modified as follow-on studies are completed and an expanded picture of an effective engineering manager is provided.

C. RECOMMENDATIONS FOR FUTURE RESEARCH

The first area for further research is to clarify the interrelationships among the seven effectiveness variables. Our analysis suggests potential causal relationships among these effectiveness variables that can be examined with further statistical analysis. In addition, this study looked at the managerial behaviors related to the four most strongly related effectiveness variables. Further analysis of the managerial behaviors related to all seven effective- ness variables can provide additional insight into the operation of this system of variables.

This study investigated empirically which managerial behaviors influence a branch manager's effectiveness as rated by engineers and scientists in a branch. To further research the managerial behaviors that relate to a branch manager's effectiveness, additional data from Division Directors and the Branch Managers could be used in conjunction with the ratings from engineers and scientists. Thus, the seven effectiveness variables would be expanded to include indicators of effectiveness based on a self-report by the branch managers and performance ratings by their division managers.

An additional follow-up study could develop a profile of managerial effectiveness with the focal group being the division directors. This research would follow the design of the current study but use data collected from branch managers (subordinates), division directors (self report) and department heads (supervisor ratings). The two studies would provide the opportunity to learn whether profiles of managerial effectiveness vary significantly by level of management.

The results of this study revealed that the engineers at NAC are relatively highly intrinsically task motivated. The importance of the intrinsic task motivation variable became evident when analyzing the results. This variable was very highly correlated with job satisfaction and strongly correlated with engineers' intentions to leave or remain at

NAC. In this study, the elements of intrinsic task motivation were collapsed into one large variable. A follow-up study could be conducted to separate the elements of intrinsic task motivation and to detail their relationship to potential causes and outcome variables.

APPENDIX A

NAVAL AVIONICS CENTER ORGANIZATION CHARTS

This appendix contains the basic functional organization
diagrams of the Naval Avionics Center and the 800/900
departments.

NAVAL AVIONICS CENTER, INDIANAPOLIS, INDIANA *

COMMAND STAFF	
SAFETY OFFICER	CODE 00C
COMMAND EVALUATION OFFICER	CODE 00D
DEEOO	CODE 00E
FLEET ADVOCATE	CODE 00F

COMMANDING OFFICER	CODE 00
EXECUTIVE DIRECTOR	CODE 01
EXECUTIVE OFFICER	CODE 02

CONTINUOUS IMPROVEMENT COUNCIL

* CONDUCT RESEARCH, DEVELOPMENT, ENGINEERING, MATERIAL ACQUISITION, PILOT AND LIMITED MANUFACTURING, TECHNICAL EVALUATION, DEPOT MAINTENANCE AND INTEGRATED LOGISTICS SUPPORT ON ASSIGNED AIRBORNE ELECTRONICS (AVIONICS), MISSILE, SPACEBORNE, UNDERSEA AND SURFACE WEAPON SYSTEMS AND RELATED EQUIPMENT

STAFF OFFICES	
MEDICAL OFFICE	CODE S005
SAFETY OFFICE	CODE S006
COMMAND EVALUATION OFFICE	CODE S012

SPECIAL ASSISTANTS	
ASSISTANT TO THE EXECUTIVE DIRECTOR	CODE S004
ASSISTANT TO THE EXECUTIVE OFFICER	CODE S008
COUNSEL	CODE S007
SSO/STILO	CODE S011
SMALL BUSINESS	CODE S009

OPERATIONS   SUPPORT

PLANS AND PROGRAMS DEPARTMENT CODE 070	PRODUCT INTEGRITY ASSURANCE DEPARTMENT CODE 400	SYSTEMS AND ENGINEERING DEPARTMENT CODE 900	COMPTROLLER DEPARTMENT CODE 300	CONTRACTING AND MATERIAL MANAGEMENT DEPARTMENT CODE 600
MANUFACTURING TECHNOLOGY DEPARTMENT CODE 200	SYSTEMS AND TECHNOLOGY DEPARTMENT CODE 800	SECURITY DEPARTMENT CODE 100	CIVILIAN PERSONNEL DEPARTMENT CODE 500	TECHNICAL AND OPERATIONS SUPPORT DEPARTMENT CODE 700

8 JAN 90	APPROVED: _K. J. Henn_ CAPT, USN, COMMANDING OFFICER	NAVAL AIR SYSTEMS COMMAND	NAVAL AVIONICS CENTER INDIANAPOLIS, INDIANA	CHART NO. 00

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SYSTEMS AND TECHNOLOGY DEPARTMENT
CODE 800
CODE 801

STAFF ASSISTANT CODE 5801	TECHNICAL CONSULTING STAFF CODE 5802	ADMINISTRATIVE STAFF CODE 5803	PROGRAM MANAGERS CODE 804

ADVANCED TECHNOLOGIES DIVISION CODE 810	SYSTEMS ENGINEERING DIVISION CODE 820	MISSION AVIONICS DIVISION CODE 830	COMMUNICATION AND NAVIGATION SYSTEMS DIVISION CODE 840	AVIONICS SYSTEMS SUPPORT DIVISION CODE 850
TECHNICAL CONSULTANT STAFF CODE 5811	PROGRAM AND SPECIAL PROJECT COORDINATORS CODE 821	TECHNICAL CONSULTANT STAFF CODE 5831	COMMAND, CONTROL, COMMUNICATION, IDENTIFICATION BRANCH CODE 842	TECHNICAL CONSULTING STAFF (SUPPORTABILITY ADVOCATE) CODE 5851
ADVANCED POWER CONVERSION SYSTEMS BRANCH CODE 812	COMPUTER SYSTEMS BRANCH CODE 822	ELECTRONIC WARFARE BRANCH CODE 832	NAVIGATION SYSTEMS BRANCH CODE 843	WEAPONS SUPPORT ENGINEERING BRANCH CODE 852
ADVANCED OPTO-ELECTRONIC TECHNOLOGIES BRANCH CODE 813	SYSTEM SUPPORT SOFTWARE BRANCH CODE 823	SENSOR SYSTEMS BRANCH CODE 833	TELEMETRY SYSTEMS BRANCH CODE 844	FLEET SUPPORT ENGINEERING BRANCH CODE 853
ADVANCED AVIONICS PACKAGING BRANCH CODE 814	TACTICAL SYSTEMS BRANCH CODE 824	TACTICAL SIGNAL PROCESSORS BRANCH CODE 834	NAVIGATION AND INSTRUMENTATION BRANCH CODE 845	AVIONICS SUPPORT ENGINEERING BRANCH CODE 854
ADVANCED RF TECHNOLOGIES BRANCH CODE 815	SOFTWARE TECHNOLOGY BRANCH CODE 825	SENSOR AND DISPLAY SYSTEMS BRANCH CODE 835	INTELLIGENCE COMMUNICATIONS BRANCH CODE 846	SUPPORT EQUIPMENT ENGINEERING BRANCH CODE 855
ADVANCED MICROCIRCUIT DEVICES AND PROCESSES BRANCH CODE 816	AVIONICS SYSTEMS BRANCH CODE 826			SUPPORT SYSTEMS ENGINEERING BRANCH CODE 856

24 JAN 89	APPROVED: _R J Henry_ CAPT, USN, COMMANDING OFFICER	NAVAL AIR SYSTEMS COMMAND	NAVAL AVIONICS CENTER INDIANAPOLIS, INDIANA	CHART NO. 800

SYSTEMS AND ENGINEERING DEPARTMENT

STAFF ASSISTANTS	SYSTEMS AND ENGINEERING DEPARTMENT	PROGRAM MANAGER
CODE 5902	CODE 900	
CODE 5903	CODE 901	CODE 907

FLEET SUPPORT ENGINEERING DIVISION CODE 910	WEAPONS ENGINEERING DIVISION CODE 920	COMMUNICATION, NAVIGATION, & INSTRUMENTATION ENGR. DIV. CODE 930	ANTI-SUBMARINE WARFARE ENGINEERING DIVISION CODE 940	ELECTRONIC SURVEILLANCE SYSTEMS DIVISION CODE 950	COMPUTER AIDED ENGINEERING DIVISION CODE 960
TECHNICAL MANAGEMENT STAFF CODE 5911	WEAPON RELEASE ENGINEERING BRANCH CODE 921	TECHNICAL CONSULTING STAFF CODE 5931	TECHNICAL CONSULTING MANAGEMENT STAFF CODE 5941	TECHNICAL CONSULTING STAFF CODE 5951	ELECTRONIC CAE SUPPORT BRANCH CODE 961
TECHNICAL SUPPORT ENGINEERING BRANCH CODE 912	WEAPON SYSTEMS ENGINEERING BRANCH A CODE 922	NAVIGATION & GUIDANCE ENGINEERING BRANCH CODE 932	ASW AVIONICS & FIXED WING ENGINEERING BRANCH CODE 942	INTEGRATED LOGISTICS ENGINEERING BRANCH CODE 952	ELECTRONIC DESIGN METHODS BRANCH CODE 962
DEPUTY PRODUCT SUPPORT ADVOCATE CODE 5913	WEAPON CONTROL ENGINEERING BRANCH A CODE 923	COMMUNICATION SYSTEMS ENGINEERING BRANCH CODE 933	ASW ROTARY WING SYSTEMS ENGINEERING BRANCH CODE 943	DESIGN ENGINEERING BRANCH CODE 953	STANDARDS AND CUSTOM BRANCH CODE 963
ELECTRONIC WARFARE ENGINEERING BRANCH A CODE 914	WEAPON CONTROL ENGINEERING BRANCH B CODE 924	AVIONICS SYSTEMS ENGINEERING BRANCH CODE 934	SONAR AND SENSOR SUPPORT ENGINEERING BRANCH CODE 944	MISSION ENGINEERING BRANCH CODE 954	ADVANCED TECHNOLOGY APPLICATIONS BRANCH CODE 964
ELECTRONIC WARFARE ENGINEERING BRANCH B CODE 915	WEAPON SYSTEMS ENGINEERING BRANCH B CODE 925	SATELLITE SYSTEMS PROCESSING ENGINEERING BRANCH CODE 935	ASW SENSOR ENGINEERING BRANCH CODE 945	ADVANCED SYSTEMS INTEGRATION BRANCH CODE 955	MECHANICAL CAE SUPPORT BRANCH CODE 965
AIRCRAFT WIRING SYSTEMS ENGINEERING BRANCH CODE 916	WEAPON GUIDANCE ENGINEERING BRANCH CODE 926	TELECOMMUNICATIONS ENGINEERING BRANCH CODE 936		FLEET INTRODUCTION TEAM (NAESU) BRANCH CODE 956	MECHANICAL DESIGN AND DOCUMENTATION BRANCH CODE 966
FLEET READINESS ENGINEERING BRANCH CODE 917					
LOGISTIC ENGINEERING BRANCH CODE 918					
ENGINEERING DEVELOPMENT LABORATORIES CODE 919					

8 JAN 90	APPROVED [signature] CAPT. USN COMMANDING OFFICER	NAVAL AIR SYSTEMS COMMAND	NAVAL AVIONICS CENTER INDIANAPOLIS, INDIANA	CHART NO. 900

APPENDIX B

800/900 DEPARTMENT MISSION STATEMENTS

This appendix contains the mission statements for the
800 and 900 departments at the Naval Avionics Center.

<u>SYSTEMS AND TECHNOLOGY DEPARTMENT</u> <u>Code 800</u>

Primary activities consist of applied research and development in the general field of core, mission, and weapon control avionics, particularly in the fields of navigation, computers, displays, and instrumentation, communications, electronic warfare, sensors, power supplies, and related support activities. Development typically proceeds through theoretical analysis and laboratory studies; fabrication of, and laboratory and flight test of, experimental, exploratory development, and advanced development models; analysis, interpretation and application of results; and support of the transition of avionics into engineering development. Secondary activities include operational development and support of deployed systems.

Serves as the Associate Executive Director for Systems and Technology, responsible for planning and execution of all workload assigned to the Systems and Technology Department.

<u>SYSTEMS AND ENGINEERING DEPARTMENT</u> <u>Code 900</u>

Provides engineering design and development of avionic systems and other related electronic and electro-mechanical products including both hardware and software elements. Such design and development activity includes all relevant disciplines such as logistics, reliability, producibility, maintainability, supportability, etc. Engineering design functions provided span the realm from component engineering through system engineering. Prepares and transfers associated engineering documentation including technical data packages, technical publications, and other necessary technical information to support the acquisition cycle. Provides technical direction and support during manufacture, installation, operation, and maintenance of engineering products including such important elements as Product Support and Software Support Activity (SSA). Serves as the "face to industry" to effect technology transfer when Center products are transitioned to the industrial base. Provides Computer Aided Engineering (CAE) leadership and service spanning the functions of technology development through production application and documentation.

Department Director serves as the Associate Executive Director for Systems and Engineering, responsible for planning and execution of all technical workload assigned to the Systems and Engineering Department.

APPENDIX C

LIST OF QUESTIONS USED IN THE PRELIMINARY INTERVIEWS

The following questions were asked during the interviews:

DEPARTMENT HEADS:

- What do you consider to be the characteristics of an effective Division Director? Branch Manager?

- Do you think that Branch Managers and Division Directors need to be technically competent?

- How do you evaluate your Division Directors?

DIVISION DIRECTORS:

- What are your strong and weak points as a Division Director?

- What are your criteria for an effective Branch Manager?

- What are your selection criteria when choosing a Branch manager?

- What are the strong and weak points of your Department Head?

- Did you have transition problems into management? If so, what were they?

BRANCH MANAGERS:

- Did you have transition problems into management? If so, what were they?

- What are your strong and weak points as a Branch manager?

- What are the strong and weak points of your Division Director?

ENGINEERS:

- What are the strong and weak points of your Branch manager?

- What are the characteristics of the "ideal" Branch manager?

APPENDIX D

EFFECTIVENESS CHARACTERISTICS FROM THE PRELIMINARY INTERVIEWS

Characteristics of Effective Engineering Branch Managers provided from the preliminary interviews.

1. Effective Communicator (10)[1]

2. Hands off style/not a micro-manager (7)

3. Good people skills (7)

4. Technical expertise-not necessarily detailed (7)

5. Motivates/challenges/gives subordinates energy (5)

6. Accessible to subordinates (5)

7. Provides direction to branch (5)

8. Candidness (4)

9. Possesses backbone/supports people (4)

10. Provides feedback/guidance (4)

11. Able to prioritize/organized (4)

12. Fairness/justice (3)

13. Involved (3)

14. Risk taker (3)

15. In tune with subordinates needs/desires-able to match with organizations goals (3)

16. Delegates (3)

17. Filter for subordinates from external influences (3)

18. Concerned about subordinates career development (3)

19. Confident in subordinate's abilities (2)
20. Promotes teamwork (2)

21. Trusts subordinates (2)

22. Good planning skills (2)

23. Recognizes potential/limits of subordinates (2)

24. Teacher (2)

25. Pro-active leadership (2)

26. Open/honest with subordinates (2)

27. Participative (2)

[1]Figures in parentheses show number of interviewees mentioning each characteristic. Only characteristics mentioned by at least two people are included in list.

APPENDIX E

<u>NAC ENGINEERING MANAGEMENT SURVEY:</u>
<u>FORM FOR ENGINEERS OR SCIENTISTS</u>

This appendix contains a copy of the questionnaire
administered to the engineers and scientists employed at the
Naval Avionics Center.

NAC ENGINEERING MANAGEMENT SURVEY:

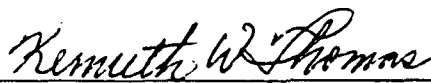## FORM FOR <u>ENGINEERS OR SCIENTISTS</u>

This questionnaire is part of a study of engineering management and motivation throughout 800 and 900. It will take 30 or 40 minutes to complete. The main purpose of the study is to identify different patterns or "styles" of engineering management and to see which patterns are most effective at NAC.

This questionnaire was custom-designed for NAC. A few questions are standard questions that have been used to study management in other settings. But most of the items address things that were suggested as being especially important at NAC by the engineers and managers we have interviewed.

This study will allow us to test their perceptions by getting <u>everyone's</u> input on what managers are actually doing and on the consequences of <u>their</u> behaviors.

These questionnaires are anonymous and confidential. After you have completed yours, please place it in the attached envelope, seal the envelope, and send it to CODE 531. We will analyze the data and prepare a report of findings. That report will be distributed widely within 800 and 900 and will also be used by the Civilian Personnel Office as an input to management training. We will also provide individual branch and division managers with confidential feedback on the average responses of their subordinates to the items of the questionnaire.

Please take this opportunity to provide your data on what is or is not effective, and to provide this anonymous and confidential feedback to your branch manager.

Professor Kenneth W. Thomas
Department of Administrative Sciences
Naval Postgraduate School

Professor Susan Hocevar
Department of Administrative Sciences
Naval Postgraduate School

ENGINEERING MANAGEMENT SURVEY

GENERAL INSTRUCTIONS

Most of the questions in this survey ask you to indicate the degree to which you agree or disagree with a statement. Below are a few sample statements:

	Strongly Disagree						Strongly Agree
1. The weather in this area is hot during the summer.	[1]	[2]	[3]	[4]	[5]	[6]	[7]✓
2. People in small towns work harder than people who work in the city.	[1]	[2]	[3]✓	[4]	[5]	[6]	[7]
3. The quality of products in the United States is decreasing.	[1]	[2]✓	[3]	[4]	[5]	[6]	[7]

For the first sample statement the person strongly agreed with the statement. For the second sample statement, the person disagreed a little. For the third sample statement, the person tended to disagree.

SECTION 1 - BACKGROUND INFORMATION

The following information is needed to help us with statistical analyses of the data.

All of your responses are strictly confidential. Individual responses will not be seen by anyone at NAC. We appreciate your help in providing this important information.

PLEASE ANSWER EACH OF THE QUESTIONS BELOW BY CHECKING THE NUMBER NEXT TO THE DESCRIPTION WHICH IS MOST TRUE OR BY WRITING IN THE CORRECT INFORMATION.

1. Are you - (Check one)

    [1] Female

    [2] Male

2. How old were you on your last birthday?

  _____ years

3. What is your GS level?

_____

4. What branch are you in? (Write in branch number)

 _____

5. How long have you been in this branch?

 _____ years and _____ months

6. How long have you been working with your current branch manager?

 _____ years and _____ months

7. Are you currently acting as a project engineer?

    [1] No

    [2] Yes

8. Which one of the following best describes the project(s) you are working on now?

[1] Basic research:

Work of a general nature intended to apply to a broad range of applications or to the development of new knowledge about an area.

[2] Applied research:

Work involving basic knowledge for the solution of a particular problem. The creation and evaluation of new concepts or components but not development for operational use.

[3] Development:

The combination of existing feasible concepts, perhaps with new knowledge, to provide a distinctly new product or process. The application of known facts and theory to solve a particular problem through exploratory study, design, and testing of new components or systems.

[4] Technical Service:

Cost/performance improvements to existing products, processes, or systems. Recombination, modification, and testing of systems using existing knowledge. Opening new markets for existing products.

9. On the average, how often do you have work-related interactions with your branch manager (larger meetings as well as one-on-one talks)?

    [1] Less than once a month

    [2] Once or twice a month

    [3] Once a week

    [4] Two or three times per week

    [5] Once a day

    [6] More than once a day

Indicate how much you agree or disagree with the following two statements.

10. In my branch, engineers or scientists need to interact frequently with the branch manager in order to do their job well.

    Strongly   Strongly
    Disagree   Agree

    [1] [2] [3] [4] [5] [6] [7]

11. In my branch, engineers or scientists need to interact frequently with other engineers and scientists in the branch in order to do their jobs well.

    Strongly   Strongly
    Disagree   Agree

    [1] [2] [3] [4] [5] [6] [7]

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SECTION 2 – BRANCH MANAGER'S BEHAVIOR

This section asks for your perceptions of a number of things which your branch manager may do. Indicate how much you agree or disagree with each statement. Some of these statements may sound similar, but it is important that you respond to each one.

My branch manager ...

	Strongly Disagree						Strongly Agree
1. Has enough technical expertise.	[1]	[2]	[3]	[4]	[5]	[6]	[7]
2. Is willing to take risks	[1]	[2]	[3]	[4]	[5]	[6]	[7]
3. Is straightforward and candid.	[1]	[2]	[3]	[4]	[5]	[6]	[7]
4. Is critical of subordinates' efforts.	[1]	[2]	[3]	[4]	[5]	[6]	[7]
5. Shows us how our activities fit into the overall mission of the center.	[1]	[2]	[3]	[4]	[5]	[6]	[7]
6. Promotes teamwork within our branch.	[1]	[2]	[3]	[4]	[5]	[6]	[7]
7. Has a vision of exciting possibilities for our branch.	[1]	[2]	[3]	[4]	[5]	[6]	[7]
8. Is a micro-manager.	[1]	[2]	[3]	[4]	[5]	[6]	[7]
9. Is sensitive to my needs and desires.	[1]	[2]	[3]	[4]	[5]	[6]	[7]
10. Lets us know the significance of what we are doing.	[1]	[2]	[3]	[4]	[5]	[6]	[7]
11. Looks for improved ways of doing things.	[1]	[2]	[3]	[4]	[5]	[6]	[7]
12. Is more strongly focused on meeting deadlines and other requirements than on doing the job well.	[1]	[2]	[3]	[4]	[5]	[6]	[7]

My branch manager ...

13. Encourages subordinates to participate
in making important decisions.   [1] [2] [3] [4] [5] [6] [7]

14. Stands up for subordinates when it counts.   [1] [2] [3] [4] [5] [6] [7]

15. Insists on high standards of performance   [1] [2] [3] [4] [5] [6] [7]

16. Is accessible to subordinates.   [1] [2] [3] [4] [5] [6] [7]

17. Makes promotion recommendations based
on individual performance.   [1] [2] [3] [4] [5] [6] [7]

18. Guides subordinates' career development.   [1] [2] [3] [4] [5] [6] [7]

19. Keeps us on schedule.   [1] [2] [3] [4] [5] [6] [7]

20. Protects the branch from unnecessary
hassles and interruptions.   [1] [2] [3] [4] [5] [6] [7]

21. Conveys a sense of urgency about meeting
the demands placed on our branch.   [1] [2] [3] [4] [5] [6] [7]

22. Assigns tasks and projects appropriately,
based on subordinates' skills and limitations.   [1] [2] [3] [4] [5] [6] [7]

23. Encourages subordinates to take risks.   [1] [2] [3] [4] [5] [6] [7]

24. Listens to subordinates.   [1] [2] [3] [4] [5] [6] [7]

25. Assigns career development opportunities
based on individual performance.   [1] [2] [3] [4] [5] [6] [7]

26. Encourages us to find ways to
improve quality.   [1] [2] [3] [4] [5] [6] [7]

27. Is too busy to talk with subordinates.   [1] [2] [3] [4] [5] [6] [7]

My branch manager ...

	Strongly Disagree						Strongly Agree
28. Is a "hands-off" manager.	[1]	[2]	[3]	[4]	[5]	[6]	[7]
29. Gives recognition for superior performance.	[1]	[2]	[3]	[4]	[5]	[6]	[7]
30. Treats me with respect.	[1]	[2]	[3]	[4]	[5]	[6]	[7]
31. Keeps us informed of the long-term aims of the organization.	[1]	[2]	[3]	[4]	[5]	[6]	[7]
32. Is aggressive in getting things done.	[1]	[2]	[3]	[4]	[5]	[6]	[7]
33. Emphasizes cooperation between branch members.	[1]	[2]	[3]	[4]	[5]	[6]	[7]
34. Seems to be looking for mistakes we might make.	[1]	[2]	[3]	[4]	[5]	[6]	[7]
35. Gives subordinates an inspiring idea of what is possible.	[1]	[2]	[3]	[4]	[5]	[6]	[7]
36. Emphasizes the importance of meeting customers' needs.	[1]	[2]	[3]	[4]	[5]	[6]	[7]
37. Runs interference for us in dealing with top management and other units.	[1]	[2]	[3]	[4]	[5]	[6]	[7]
38. Pushes ahead in a positive manner.	[1]	[2]	[3]	[4]	[5]	[6]	[7]
39. Assigns work equitably.	[1]	[2]	[3]	[4]	[5]	[6]	[7]
40. Is willing to admit mistakes.	[1]	[2]	[3]	[4]	[5]	[6]	[7]
41. In all, I am satisfied with my branch manager.	[1]	[2]	[3]	[4]	[5]	[6]	[7]

My branch manager ...

42. Assigns desirable tasks based
on individual performance. [1] [2] [3] [4] [5] [6] [7]

43. Doesn't "spoon-feed" us with too
much guidance on how to do things. [1] [2] [3] [4] [5] [6] [7]

44. Views mistakes as a learning experience
and doesn't hold them against you. [1] [2] [3] [4] [5] [6] [7]

45. Drops by to talk with me. [1] [2] [3] [4] [5] [6] [7]

46. Worries about what might go wrong. [1] [2] [3] [4] [5] [6] [7]

47. Is impatient about ideas or questions
which deviate from things he/she believes
must be done. [1] [2] [3] [4] [5] [6] [7]

48. Genuinely cares about subordinates. [1] [2] [3] [4] [5] [6] [7]

49. Provides a sense of direction for this branch. [1] [2] [3] [4] [5] [6] [7]

50. Is able to prioritize tasks effectively. [1] [2] [3] [4] [5] [6] [7]

51. Implements subordinates' ideas. [1] [2] [3] [4] [5] [6] [7]

52. Keeps us informed of possible
surprises/roadblocks. [1] [2] [3] [4] [5] [6] [7]

53. Complains about what is wrong around here. [1] [2] [3] [4] [5] [6] [7]

54. Always seems to be pushing us. [1] [2] [3] [4] [5] [6] [7]

55. In all, I am satisfied that the
methods of leadership used by my
branch manager are the right ones for
getting my group's job done. [1] [2] [3] [4] [5] [6] [7]

My branch manager ...

	Strongly Disagree						Strongly Agree
56. Has confidence in subordinates.	[1]	[2]	[3]	[4]	[5]	[6]	[7]
57. Provides helpful feedback.	[1]	[2]	[3]	[4]	[5]	[6]	[7]
58. Helps us develop ideas.	[1]	[2]	[3]	[4]	[5]	[6]	[7]
59. Knows how to work with others outside our branch to get things done.	[1]	[2]	[3]	[4]	[5]	[6]	[7]
60. Trusts subordinates.	[1]	[2]	[3]	[4]	[5]	[6]	[7]
61. Gives subordinates clear guidance.	[1]	[2]	[3]	[4]	[5]	[6]	[7]
62. Mostly tells us why things can't be done.	[1]	[2]	[3]	[4]	[5]	[6]	[7]
63. Tends to overreact to problems or setbacks.	[1]	[2]	[3]	[4]	[5]	[6]	[7]
64. Is an effective teacher.	[1]	[2]	[3]	[4]	[5]	[6]	[7]
65. Helps us feel good about our achievements.	[1]	[2]	[3]	[4]	[5]	[6]	[7]
66. Gives us credit for our successes.	[1]	[2]	[3]	[4]	[5]	[6]	[7]

67. Please provide an <u>overall</u> rating of the effectiveness of your branch manager.

Not at all Effective		Somewhat Effective		Quite Effective		Extremely Effective
[1]	[2]	[3]	[4]	[5]	[6]	[7]

SECTION 3 - BRANCH CLIMATE

This section asks you about what happens when you interact with other engineers or scientists within your branch. Indicate how much you agree or disagree with each statement.

In this branch ...

	Strongly Disagree						Strongly Agree
1. People often seem stressed.	[1]	[2]	[3]	[4]	[5]	[6]	[7]
2. Everyone's opinions get listened to.	[1]	[2]	[3]	[4]	[5]	[6]	[7]
3. There are feelings among members which tend to pull the group apart.	[1]	[2]	[3]	[4]	[5]	[6]	[7]
4. We get along with each other very well.	[1]	[2]	[3]	[4]	[5]	[6]	[7]
5. When one of us does well, the others are honestly happy for him or her.	[1]	[2]	[3]	[4]	[5]	[6]	[7]
6. There is an atmosphere of confidence.	[1]	[2]	[3]	[4]	[5]	[6]	[7]
7. People are sometimes inflexible about reexamining their assumptions on what they are doing.	[1]	[2]	[3]	[4]	[5]	[6]	[7]
8. People are strongly committed to meeting project deadlines.	[1]	[2]	[3]	[4]	[5]	[6]	[7]
9. We are ready to defend each other from criticism by outsiders.	[1]	[2]	[3]	[4]	[5]	[6]	[7]
10. People are preoccupied with whether or not they are accomplishing what they need to.	[1]	[2]	[3]	[4]	[5]	[6]	[7]

In this branch ...

	Strongly Disagree						Strongly Agree
11. People help you feel good about your abilities.	[1]	[2]	[3]	[4]	[5]	[6]	[7]
12. Members tell each other the way we are feeling.	[1]	[2]	[3]	[4]	[5]	[6]	[7]
13. There is constant bickering.	[1]	[2]	[3]	[4]	[5]	[6]	[7]
14. People are receptive to creative new ways of looking at our tasks.	[1]	[2]	[3]	[4]	[5]	[6]	[7]
15. People are able to work at a natural work pace.	[1]	[2]	[3]	[4]	[5]	[6]	[7]
16. Members have a "can-do" attitude toward their job.	[1]	[2]	[3]	[4]	[5]	[6]	[7]
17. People are strongly committed to doing work of high technical quality.	[1]	[2]	[3]	[4]	[5]	[6]	[7]
18. We help each other on the job.	[1]	[2]	[3]	[4]	[5]	[6]	[7]
19. We give each other recognition for good work.	[1]	[2]	[3]	[4]	[5]	[6]	[7]
20. My co-workers are afraid to express their real views.	[1]	[2]	[3]	[4]	[5]	[6]	[7]
21. Some of the people I work with have no respect for others.	[1]	[2]	[3]	[4]	[5]	[6]	[7]
22. It is easy for people to change directions to take advantage of new opportunities they encounter.	[1]	[2]	[3]	[4]	[5]	[6]	[7]

In this branch ...

	Strongly Disagree						Strongly Agree
23. People work under a strong sense of pressure.	[1]	[2]	[3]	[4]	[5]	[6]	[7]
24. The branch is able to respond to unusual demands placed upon it.	[1]	[2]	[3]	[4]	[5]	[6]	[7]
25. There is strong committment to satisfying customers' wishes.	[1]	[2]	[3]	[4]	[5]	[6]	[7]
26. People often acknowledge one another for their efforts.	[1]	[2]	[3]	[4]	[5]	[6]	[7]
27. We stick together.	[1]	[2]	[3]	[4]	[5]	[6]	[7]
28. If we have a decision to make, everyone is involved in making it.	[1]	[2]	[3]	[4]	[5]	[6]	[7]
29. People who offer new ideas are likely to get "clobbered".	[1]	[2]	[3]	[4]	[5]	[6]	[7]
30. There is a sense of urgency about getting things done.	[1]	[2]	[3]	[4]	[5]	[6]	[7]

SECTION 4 - FEELINGS ABOUT WORK

This section asks you about different types of feelings you may have concerning your work. Knowing these feelings will help us evaluate some aspects of management effectiveness at NAC.

On this job ...

	Strongly Disagree						Strongly Agree
1. I care about what I am doing.	[1]	[2]	[3]	[4]	[5]	[6]	[7]
2. I am developing my own special abilities.	[1]	[2]	[3]	[4]	[5]	[6]	[7]
3. My opinion of myself goes up when I do this job well.	[1]	[2]	[3]	[4]	[5]	[6]	[7]
4. I often think about quitting.	[1]	[2]	[3]	[4]	[5]	[6]	[7]
5. My job measures up to the sort of of job I wanted when I took it.	[1]	[2]	[3]	[4]	[5]	[6]	[7]
6. I am proficient at what I am doing.	[1]	[2]	[3]	[4]	[5]	[6]	[7]
7. I have a sense that things are moving along well.	[1]	[2]	[3]	[4]	[5]	[6]	[7]
8. I feel free to select different paths or approaches in my work.	[1]	[2]	[3]	[4]	[5]	[6]	[7]
9. I am getting results.	[1]	[2]	[3]	[4]	[5]	[6]	[7]
10. I am good at my job.	[1]	[2]	[3]	[4]	[5]	[6]	[7]
11. My projects are going well.	[1]	[2]	[3]	[4]	[5]	[6]	[7]
12. I am growing and developing professionally on this job.	[1]	[2]	[3]	[4]	[5]	[6]	[7]

On this job ...

	Strongly Disagree						Strongly Agree

13. I feel a great sense of personal
satisfaction when I do this job well.   [1] [2] [3] [4] [5] [6] [7]

14. I will probably look for a new
job in the next year.   [1] [2] [3] [4] [5] [6] [7]

15. I am generally satisfied with
the kind of work I do on this job.   [1] [2] [3] [4] [5] [6] [7]

16. I have felt fidgety or nervous
as a result of my job.   [1] [2] [3] [4] [5] [6] [7]

17. I often feel weak all over.   [1] [2] [3] [4] [5] [6] [7]

18. How I go about doing things is up to me.   [1] [2] [3] [4] [5] [6] [7]

19. My work serves a valuable purpose.   [1] [2] [3] [4] [5] [6] [7]

20. I am performing competently.   [1] [2] [3] [4] [5] [6] [7]

21. I am learning useful new things
in my job.   [1] [2] [3] [4] [5] [6] [7]

22. I feel bad and unhappy when I discover
that I have performed poorly on this job.   [1] [2] [3] [4] [5] [6] [7]

23. If I had a different job, my health
would probably improve.   [1] [2] [3] [4] [5] [6] [7]

24. Generally speaking, I am very
satisfied with this job.   [1] [2] [3] [4] [5] [6] [7]

25. My projects are significant
to me.   [1] [2] [3] [4] [5] [6] [7]

On this job ...

	Strongly Disagree						Strongly Agree
26. I have a sense of freedom in what I am doing.	[1]	[2]	[3]	[4]	[5]	[6]	[7]
27. I am affecting the course things take.	[1]	[2]	[3]	[4]	[5]	[6]	[7]
28. The work I am doing is important.	[1]	[2]	[3]	[4]	[5]	[6]	[7]
29. I am doing my work capably.	[1]	[2]	[3]	[4]	[5]	[6]	[7]
30. I am determining what I do on my job.	[1]	[2]	[3]	[4]	[5]	[6]	[7]
31. What I am trying to accomplish is meaningful to me.	[1]	[2]	[3]	[4]	[5]	[6]	[7]
32. I feel I have a lot of latitude in what I am doing.	[1]	[2]	[3]	[4]	[5]	[6]	[7]
33. I am demonstrating my abilities.	[1]	[2]	[3]	[4]	[5]	[6]	[7]
34. I am exercising a lot of choice in what I do.	[1]	[2]	[3]	[4]	[5]	[6]	[7]
35. I am skillful in my work.	[1]	[2]	[3]	[4]	[5]	[6]	[7]
36. I am doing worthwhile things.	[1]	[2]	[3]	[4]	[5]	[6]	[7]
37. I am having an impact.	[1]	[2]	[3]	[4]	[5]	[6]	[7]
38. I am accomplishing my objectives.	[1]	[2]	[3]	[4]	[5]	[6]	[7]
39. I seem to tire quickly.	[1]	[2]	[3]	[4]	[5]	[6]	[7]
40. My own feelings generally are not affected much one way or the other by how well I do on this job.	[1]	[2]	[3]	[4]	[5]	[6]	[7]

41. How likely is it that you will actively look for a new job in the next year?

Not at all Likely		Somewhat Likely		Quite Likely		Extremely Likely
[1]	[2]	[3]	[4]	[5]	[6]	[7]

42. Knowing what you know now, if you had to decide all over again whether to take the job you now have, what would you decide?

[1] I would definitely not take the job again.

[2] I would probably not take the job again.

[3] I am not sure if I would take the job again.

[4] I would probably take the job again.

[5] I would definitely take the job again.

43. Most people have days when they feel tired or worn out during a good part of the day. How often does this happen to you?

[1] Very rarely or never.

[2] About 5% of the time.

[3] About 10% of the time.

[4] About 25% of the time.

[5] About 50% of the time.

[6] More than 50% of the time.

44. How often do you feel nervous, tense, or edgy while on the job?

[1] Very rarely or never.

[2] About 5% of the time.

[3] About 10% of the time.

[4] About 25% of the time.

[5] About 50% of the time.

[6] More than 50% of the time.

SECTION 5 - WAYS OF THINKING

This section asks you about different patterns or tendencies that may exist in your thinking. We have learned from previous research that knowing these ways of thinking can better help us interpret your answers to other questions in this survey, and better understand what is occurring in your branch. Please answer these questions candidly. The only right answer is what you honestly feel.

	Strongly Disagree						Strongly Agree
1. When something I do is successful, I see it as evidence of my capabilities.	[1]	[2]	[3]	[4]	[5]	[6]	[7]
2. I usually have a clear vision, in my mind's eye, of things working out well.	[1]	[2]	[3]	[4]	[5]	[6]	[7]
3. I tend to worry about whether things will go wrong.	[1]	[2]	[3]	[4]	[5]	[6]	[7]
4. I often find myself turning other people's requests of me into mandates or obligations.	[1]	[2]	[3]	[4]	[5]	[6]	[7]
5. When things are going well, it is easy for me to recognize how my own skills have contributed to it.	[1]	[2]	[3]	[4]	[5]	[6]	[7]
6. I often find myself visualizing the attainment of outcomes I seek.	[1]	[2]	[3]	[4]	[5]	[6]	[7]
7. When considering a course of action that would be a good idea, I often begin to treat it as something I have to do.	[1]	[2]	[3]	[4]	[5]	[6]	[7]
8. Setbacks often cause me to feel incompetent.	[1]	[2]	[3]	[4]	[5]	[6]	[7]

	Strongly Disagree						Strongly Agree

9. When on a project with others, I seem more likely than them to view the project as something which needs to be done.   [1] [2] [3] [4] [5] [6] [7]

10. I frequently find myself with mental images of succeeding.   [1] [2] [3] [4] [5] [6] [7]

11. I generally give myself credit for my successes.   [1] [2] [3] [4] [5] [6] [7]

12. I often focus on the potential for failure when thinking about the future.   [1] [2] [3] [4] [5] [6] [7]

13. I tend to be the kind of person who keeps emphasizing to myself how necessary it is to complete my tasks.   [1] [2] [3] [4] [5] [6] [7]

14. When something goes wrong, my first reaction is often to exaggerate how bad it is – to see it as a disaster.   [1] [2] [3] [4] [5] [6] [7]

15. I often form a picture in my mind of succeeding.   [1] [2] [3] [4] [5] [6] [7]

16. I let myself feel competent when things are getting done.   [1] [2] [3] [4] [5] [6] [7]

17. When things are going badly, I begin to think that something is wrong with me.   [1] [2] [3] [4] [5] [6] [7]

18. I have no trouble seeing the role of my abilities in the progress that I make.   [1] [2] [3] [4] [5] [6] [7]

19. I often seem to create demands and requirements for myself.   [1] [2] [3] [4] [5] [6] [7]

	Strongly Disagree						Strongly Agree

20. I tend to envision the accomplishment of goals I am pursuing.

[1] [2] [3] [4] [5] [6] [7]

21. When people give me feedback which is both positive and negative, I tend to overlook the positive and experience it as negative.

[1] [2] [3] [4] [5] [6] [7]

22. I often interpret guidelines as though they were imperatives.

[1] [2] [3] [4] [5] [6] [7]

23. I often imagine myself realizing a goal.

[1] [2] [3] [4] [5] [6] [7]

24. When I accomplish something, I tend to see my talents as an important reason for it.

[1] [2] [3] [4] [5] [6] [7]

25. It seems as though I am continually reminding myself of what has to be done.

[1] [2] [3] [4] [5] [6] [7]

26. In my own mind, things that I decide I want to do seem to turn into things that I must do.

[1] [2] [3] [4] [5] [6] [7]

THANK YOU FOR TAKING THE TIME TO ANSWER THESE QUESTIONS. PLEASE PUT THIS COMPLETED QUESTIONNAIRE IN THE ATTACHED ENVELOPE, SEAL IT, AND SEND IT TO "CODE 531."

APPENDIX F

QUESTIONNAIRE ITEMS THAT MADE UP THE FINAL EFFECTIVENESS VARIABLES

(1) Intrinsic Task Motivation

F3, F13, F2, F12, F21, F1, F19, F25, F28, F31, F36, F6, F10, F20, F29, F33, F35, F7, F9, F11, F27, F37, F38, F8, F18, F26, F30, F32, F34

(Note: The F indicates that these items are from Section 4 --Feelings About Work section of the questionnaire and the number indicates the particular item in that section.)

(2) General Managerial Effectiveness

MB41, MB55, MB67

(Note: The MB indicates that these items are from Section 2 --Branch Manager's Behavior section of the questionnaire and the number indicates the particular item in that section.)

(3) Job Satisfaction

F5, F15, F24, F42

(4) Positive Work Climate

C28, C20, C2, C29, C9, C18, C4, C27, C5, C19, C11, C26, C8, C25, C17, C16, C6, C24, C22, C14

(Note: The C indicates that these items are from Section 3 --Branch Climate section of the questionnaire and the number indicates the particular item in that section.)

(5) Group Problems

C3, C21, C13, C7

(6) Intention to Leave

F4, F14, F41

(7) Stress

F17, F16, F23, F39, F43, F44

APPENDIX G

MANAGERIAL BEHAVIORS WHICH MOST CORRELATED WITH STRESS, GROUP PROBLEMS AND INTENTION TO LEAVE EFFECTIVENESS VARIABLES

MANAGERIAL BEHAVIORS MOST STRONGLY CORRELATED WITH GROUP PROBLEMS	
Managerial Behavior	Correlation Coefficient
1. Protects branch from unnecessary hassles and interruptions. (MB20)	-.48
2. Assigns tasks and projects appropriately, based on subordinates' skills and limitations. (MB22)	-.46
3. Trusts subordinates. (MB60)	-.44
4. Looks for improved ways of doing things. (MB11)	-.42
5. Has confidence in subordinates. (MB56)	-.41
6. Promotes teamwork within our branch. (MB6)	-.41
7. Encourages subordinates to participate in making important decisions. (MB13)	-.40
8. Assigns work equitably. (MB39)	-.40
9. Is an effective teacher. (MB64)	-.40
10. Lets us know the significance of what we are doing. (MB10)	-.36

MANAGERIAL BEHAVIORS MOST STRONGLY CORRELATED WITH STRESS	
Managerial Behavior	Correlation Coefficient
1. Protects the branch from unnecessary hassles and interruptions. (MB20)	-.53
2. Stands up for subordinates when it counts. (MB14)	-.46
3. Is a "hands off" manager. (MB28)	+.44
4. Assigns career development opportunities based on individual performance. (MB25)	-.44
5. Keeps us informed of possible surprises/roadblocks. (MB52)	-.41
6. Is an effective teacher. (MB64)	-.40
7. Is accessible to subordinates. (MB16)	-.39
8. Has enough technical expertise.(MB1)	-.38
9. Gives subordinates an inspiring idea of what is possible. (MB35)	-.36
10. Assigns desirable tasks based on individual performance. (MB42)	-.36

MANAGERIAL BEHAVIORS MOST STRONGLY CORRELATED WITH INTENTION TO LEAVE	
Managerial Behavior	Correlation Coefficient
1. Guides subordinates'career development.(MB18)	-.49
2. Runs interference for us in dealing with top management and other units.(MB37)	-.48
3. Assigns career development opportunities based on individual performance.(MB25)	-.46
4. Gives recognition for superior performance.(MB29)	-.43
5. Has a vision of exciting possibilities for our branch.(MB7)	-.43
6. Is aggressive in getting things done.(MB32)	-.42
7. Shows us how our activities fit into the overall mission of the Center.(MB5)	-.42
8. Stands up for subordinates when it counts.(MB14)	-.41
9. Provides a sense of direction for this branch.(MB49)	-.39
10. Gives us credit for our successes.(MB66)	-.39

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